

2. Remarks/Discussion of Issues

Claim Summary

By the present Amendment, claims 1, 4, 8, 11, 15, 18 and 21-23 have been amended. Claims 1-4, 7-11, 14-18 and 20-23 are pending in the application. Applicant respectfully submits that all pending claims are in condition for allowance.

35 U.S.C. § 112 Rejection - Claims 1-4, 7-11, 14-18 and 20-23

The Office Action rejects claims 1-4, 7-11, 14-18 and 20-23 under 35 U.S.C. § 112, first paragraph, for failing to comply with the enablement requirement. *See* Office Action, p. 2.

By the present Amendment, independent claims 1, 8 and 15 have been revised, and thus Applicant submits that the rejection under 35 U.S.C. § 112, first paragraph, is therefore moot. In addition, Applicant disagrees with the Examiner's characterization that FIGs. 6 and 7 of the present application show either line or frame interpolation and that MOCHIZUKI (discussed below) "demonstrates" the subject matter of FIGs. 6 and 7. *See* Office Action, p. 2. FIGs. 6 and 7 illustrate embodiments in which straight-line interpolations are performed of data in the time dimension to increase apparent frame rate of three-dimensional volumes. *See, e.g.,* Specification, p. 3, lines 27-28; p. 6, lines 27-30; p. 7, lines 14-17). In contrast, MOCHIZUKI discloses only interpolations between adjacent beams/frames in the spatial domain to increase the apparent number of ultrasound beams of one three-dimensional volume. *See, e.g.,* col. 9, lines 32-44.

Further, Applicant disagrees with the assertion that "the specification does not describe any additional element of the volume interpolator or any type of mathematical calculation that makes the interpolation of volumes distinct from the line or frame interpolator." *See* Office Action, p. 3. The Specification provides that straight line interpolation (among other types of interpolation), for example, may be performed for interpolating three-dimensional volumes (*see, e.g.,* FIG. 3, 250; p. 6, lines 27-29) or for interpolating two-dimensional volumes (*see, e.g.,* FIG. 4, 340; p. 7, lines 14-16).

Accordingly, Applicant respectfully requests withdrawal of the rejection 35 U.S.C. § 112, first paragraph.

35 U.S.C. § 103 Rejections - Claims 1-4, 7-11, 14-18 and 20-23

The Office Action rejects claims 1-4, 7-11, 14-18 and 20-23 under 35 U.S.C. § 103(a) as being unpatentable over MOCHIZUKI (U.S. Patent No. 6,263,093). Applicant respectfully traverses the rejection for at least the reasons set forth herein.

A *prima facie* case of obviousness has at least three requirements. First, the prior art relied upon, coupled with the knowledge generally available in the art at the time of the invention, requires some reason that the skilled artisan would modify a reference or to combine references. *Princeton Biochemicals, Inc. v. Beckman Coulter, Inc.*, 411 F.3d 1332 (Fed. Cir. 2005). The Supreme Court has, however, cautioned against the use of “rigid and mandatory formulas” particularly with regards to finding reasons prompting a person of ordinary skill in the art to combine elements in the way the claimed new invention does. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 127 S. Ct. 1727, 82 USPQ2d 1385 (2007). Second, the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the same time the invention was made. In other words, a hindsight analysis is not allowed. *Amgen, Inc. v. Chugai Pharm. Co.*, 927 F.2d 1200 (Fed. Cir. 1991). Also, “[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR*, 127 S. Ct. at 1741, 82 USPQ2d at 1396. Lastly, the prior art reference or combination of references must teach or suggest all the limitations of the claims. *In re Wilson*, 424 F.2d 1382 (C.C.P.A. 1970).

Applicant’s silence on certain aspects of the rejection is by no means a concession as to their propriety. Rather, because the applied art fails to disclose at least one feature of the claims, for at least the reasons discussed below, Applicant respectfully submits that the rejections are improper and should be withdrawn.

As an initial matter, Applicant notes that the Office Action does not address claims

specifically by claim number or specific claim elements. *See* Office Action, pp. 3-4. Rather, as in the previous Office Actions (March 3, 2009 and June 30, 2009), the present Office Action merely provides a narrative of what is allegedly disclosed by MOCHIZUKI, leaving Applicant in the precarious position of having to surmise that which may be considered by the Examiner to disclose the various claim elements.

Accordingly, Applicant respectfully submits that the rejection fails to comply with MPEP § 706 and 37 CFR § 1.104(c)(2), and that the Examiner therefore has not established a *prima facie* case of obviousness with respect to the claims. Applicant further submits that the rejection of claims 1-4, 7-11, 14-18 and 20-23 under 35 U.S.C. § 103(a) should be withdrawn. Further, in light of the failure of the Office Action to comply with MPEP § 706 and 37 CFR § 1.104(c)(2), if further rejections are provided in subsequent official communications, Applicant respectfully submits that such rejections cannot be made properly final. Notwithstanding, Applicant addresses the rejection below.

Claim 1

Independent claim 1 recites, in part:

“ ... an interpolator that interpolates three-dimensional ultrasound-image data corresponding to at least two sequential detected images in an image data stream to obtain at least one interpolated three-dimensional volume, providing up sampled three-dimensional volumes in a time dimension for increasing frame rate.”

The Office Action asserts that “interpolator” is disclosed by the line interpolation section 23 and/or the frame interpolation section 30 in FIG. 1 of MOCHIZUKI. *See* Office Action, p. 3. However, both the line interpolation section 23 and the frame interpolation section 30 perform spatial interpolation (in a spatial dimension). That is, the line interpolation section 23 interpolates between adjacent ultrasound beams and the frame interpolation section 30 interpolates between adjacent frames. *See, e.g.,* col. 9, lines 32-36; col. 10, lines 36-38).

As a result, the MOCHIZUKI increases the number of beams and frames used to construct a single 3D ultrasound image. *See, e.g.,* col. 11, lines 53-56.

In contrast, the interpolator recited in claim 1 interpolates three-dimensional ultrasound-image data corresponding to at least two sequential detected images in an image data stream to obtain at least one interpolated three-dimensional volume. The interpolator thereby provides up sampled three-dimensional volumes in a time dimension, which increases frame rate. *See, e.g.,* Specification, p. 3, lines 27-28; p. 6, lines 27-31; p. 7, lines 14-21; p. 8, lines 10-12 and 25-26. In other words, more three-dimensional volumes are created (up sampled) in the time domain to increase the apparent frame rate, as opposed to MOCHIZUKI, which teaches creating more data (lines/frames) in a spatial dimension for a single three-dimensional volume.

Accordingly, for at least the reasons stated above, Applicant respectfully submits that claim 1 is allowable over MOCHIZUKI, and requests withdrawal of the rejection of claim 1 under 35 U.S.C. § 103(a).

Claim 8

Independent claim 8 recites, in part:

" ... creating up sampled ultrasound image three-dimensional volumes in a time dimension from a plurality of three-dimensional volumes using interpolation; storing at least one of the three-dimensional volumes and the up sampled ultrasound image three-dimensional volumes; and rendering the up sampled ultrasound image three-dimensional volumes into display data, wherein creating the up sampled ultrasound image three-dimensional volumes comprises interpolating three-dimensional ultrasound image data corresponding to at least two sequential detected images to obtain at least one interpolated three-dimensional volume."

Applicant respectfully submits that MOCHIZUKI does not disclose each and every feature of claim 8, at least for substantially the same reasons discussed above with respect to claim 1, as well as in view of its additional recitations. Accordingly, Applicant submits that

claim 8 is allowable over MOCHIZUKI, and requests withdrawal of the rejection of claim 8 under 35 U.S.C. § 103(a).

Claim 15

Independent claim 15 recites, in part:

" ... an interpolator that interpolates three-dimensional coordinates of ultrasound image data corresponding to at least two sequential detected images in an image data stream to obtain at least one interpolated three-dimensional object, providing up sampled three-dimensional objects in a time dimension for an increased frame rate "

Applicant respectfully submits that MOCHIZUKI does not disclose each and every feature of claim 8, at least for substantially the same reasons discussed above with respect to claim 1, as well as in view of its additional recitations. Accordingly, Applicant submits that claim 8 is allowable over MOCHIZUKI, and requests withdrawal of the rejection of claim 8 under 35 U.S.C. § 103(a).

Claims 2-4, 7, 9-11, 14, 16-18 and 20-23

With regard to claims 2-4, 7, 9-11, 14, 16-18 and 20-23, Applicant asserts that they are allowable at least because they depend, directly or indirectly, from independent claims 1, 8 and 15, respectively, which Applicant submits have been shown to be allowable over MOCHIZUKI, as well as in view of their additional recitations. For example, the Examiner still has not specifically addressed claims 4, 11 and 15.

Conclusion

In view of the foregoing explanations, Applicant respectfully requests that the Examiner reconsider and reexamine the present application, allow claims 1-4, 7-11, 14-18 and 20-23 and pass the application to issue.

In the event that there are any outstanding matters remaining in the present application,

Appl. No. 10/544,143
Amendment and/or Response
In Reply to Office action of November 24, 2009

the Examiner is invited to contact Van C. Ernest (Reg. No. 44,099) at (571) 283.0720 to discuss these matters.

Respectfully submitted on behalf of:
Philips Electronics North America Corp.

A handwritten signature in black ink, appearing to read 'V. C. Ernest', is written over a horizontal line.

by: Van C. Ernest (Reg. No. 44,099)

Date: February 19, 2010

Volentine & Whitt, PLLC
One Freedom Square
11951 Freedom Drive, Suite 1260
Reston, Virginia 20190
Telephone No.: (571) 283.0724
Facsimile No.: (571) 283.0740